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Research Article

# Description of six new crab-spider species and first description of the male of *Pharta xizang* Liu & Yao, 2023 from Medog, Xizang, China (Araneae, Thomisidae)

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## Abstract

Seven species of the crab-spider family Thomisidae from Medog, Xizang, China are described here, including six new species: *Camaricus medog* Wang, Lu & Zhang, **sp. nov.** (♂♀), *Monaeses xizang* Wang, Lu & Zhang, **sp. nov.** (♂♀), *Sinothomisus beibeng* Wang, Lu & Zhang, **sp. nov.** (♂♀), *Sinothomisus dawai* Wang, Lu & Zhang, **sp. nov.** (♂♀), *Spilosynema motuo* Wang, Lu & Zhang, **sp. nov.** (♂♀), and *Thomisus yarang* Wang, Lu & Zhang, **sp. nov.** (♂♀). The male of *Pharta xizang* Liu & Yao, 2023 is described here for the first time. Descriptions and photographs of all the species are provided.

**Key words:** Description, morphology, new species, taxonomy

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## Introduction

Medog, a county seat of Nyingchi City, located downstream of the Yarlung Zangbo River, is a key transitional zone between the Eastern Himalayas and Hengduan Mountain region. The topography of Medog is complex and with a variety of vegetation types from tropical valley monsoon rain forest to cold ice sheet between the Yarlung Zangbo Grand Canyon to the summit of Nangabawa (Wang and Peng 2022). Medog is the most northerly tropical region in the Northern Hemisphere and is affected by a subtropical humid climate due to the warm and humid airflow from the Indian Ocean. It is the lowest area of the Tibetan Plateau, with the best hydrothermal conditions and the greatest precipitation (Li et al. 2024). The unique geographical environment and climate have contributed to the rich biodiversity of Medog. However, due to the remote location, complex environment, and inconvenient transportation, the research of spider diversity in Medog has not been achieved until recently with improvements in transportation. According to preliminary statistics, only 34 species have been recorded from Medog, most of them published since 2017 (Table 1).

Our team has been investigating the spider diversity of Medog since 2018, and we have found more than 300 species, including many undescribed species. Here, seven crab-spider species are described, including six new species and the male of *Pharta xizang* new to science.

## Materials and methods

All specimens are preserved in 75% ethanol and were examined, illustrated, photographed, and measured using a Leica M205A stereomicroscope equipped with a Leica DFC450 Camera and LAS software (v. 4.6). Male pedipalps and epigynes were examined and illustrated after dissection. Epigynes were cleared by immersing them in a pancreatin solution (Álvarez-Padilla and Hormiga 2007). Eye sizes were measured as the maximum dorsal diameter. Leg measurements are shown as: total length (femur, patella and tibia, metatarsus, tarsus). All measurements are in millimetres. All specimens, including the holotypes examined here, are deposited in the Collection of Spiders, School of Life Sciences, Southwest University, Chongqing, China (**SWUC**).

Terminology follows Tang and Li (2010). Abbreviations used in the text: **ALE**–anterior lateral eye; **AME**–anterior median eye; **MOA**–median ocular area; **PLE**–posterior lateral eye; **PME**–posterior median eye.

## Taxonomy

**Family Thomisidae Sundevall, 1833** (蟹蛛科)
**Genus *Camaricus* Thorell, 1887** (顶蟹蛛属)

***Camaricus medog* Wang, Lu & Zhang, sp. nov.**
https://zoobank.org/D88E4BFE-1E8B-4050-B5CE-29730C9E751B
Figs 1A, B, 3A, B, 4, 11
Common name. 墨脱顶蟹蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-01-01), China, Xizang, Medog County, Mirage observation deck, 29°20'36"N, 95°20'43"E, elev. 1297 m, 8 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg. ***Paratypes*:** • 1 ♂ 4 ♀ (SWUC-T-THO-01-02~06), same data as for holotype.

**Etymology.** The specific name is derived from the type locality; it is a noun in apposition.

**Diagnosis.** The new species resembles *C. formosus* Thorell, 1887 (Song and Zhu 1997: 173, fig. 122A–D) in having the embolus origin in the same position, but *C. medog* differs from the latter by the short and blunt ventral tibial apophysis end (vs long and sharp in *C. formosus*), a bifurcated retrolateral tibial apophysis (vs single in *C. formosus*), a broad embolus (vs slender in *C. formosus*), and a distinct copulatory atrium (vs indistinct in *C. formosus*) (Fig. 4).

**Description. Male** holotype (SWUC-T-THO-01-01, Figs 1A, 3A) total length 4.50. Prosoma 2.40 long, 2.09 wide; opisthosoma 2.03 long, 1.69 wide. Carapace black. Eye sizes and interdistances: AME 0.12, ALE 0.16, PME 0.05, PLE 0.12; AME–AME 0.39, AME–ALE 0.34, PME–PME 0.68, PME–PLE 0.51, ALE–PLE 0.31. MOA 0.33 long, anterior width 0.66, posterior width 0.82. Clypeus height 0.21. Chelicerae black, with 3 promarginal and 3 retromarginal teeth. Labium

**Table 1.** List of spider species recorded from Medog.

| Family | Species | Distribution | References |
|---|---|---|---|
| Agelenidae | *Draconarius medogensis* | Medog | Zhu et al. 2017 |
| | *Draconarius subaspinatus* | Medog | |
| Anapidae | *Sinanapis medogensis* | Medog | Zhang and Lin 2018 |
| Araneidae | *Araneus motuoensis* | Medog | Yin et al. 1990 |
| | *Argiope beibeng* | Medog | Mi et al. 2024 |
| | *Argiope caesarea* | China (Xiang and Yunnan), India and Myanmar | |
| Clubionidae | *Clubiona medog* | Medog | Zhang et al. 2007 |
| Corinnidae | *Apochinomma medog* | Medog | Zhang and Zhang 2023 |
| Ctenidae | *Amauropelma medogensis* | Medog | Wang et al. 2024a |
| | *Anahita medog* | Medog, Chayu of Xizang | Chu et al. 2022 |
| | *Bowie rotundus* | Medog | Wang et al. 2024a |
| Halonoproctidae | *Conothele medoga* | Medog | Zhang and Yu 2021 |
| Lycosidae | *Serratacosa medogensis* | Medog | Wang et al. 2021 |
| | *Zantheres gracillimus* | Medog; Bhamo of Myanmar | Wang and Zhang 2020 |
| Oonopidae | *Ischnothyreus metok* | Medog | Tong et al. 2023 |
| | *Paramolotra metok* | Medog | Cheng et al. 2021 |
| Pholcidae | *Belisana medog* | Medog | Zhu et al. 2020 |
| | *Pholcus medog* | Medog | Zhang et al. 2006 |
| Pisauridae | *Hygropoda medogensis* | Medog | Lu et al. 2023 |
| Psilodercidae | *Leclercera aniensis* | Medog | Chang and Li 2020 |
| | *Leclercera duandai* | Medog | |
| | *Leclercera renqinensis* | Medog | |
| | *Merizocera nyingchi* | Medog | Chang et al. 2020 |
| Salticidae | *Chrysilla yarlungzangbo* | Medog | Yang and Zhang 2024 |
| | *Hyllus qishuoi* | Medog | Xiong et al. 2017 |
| | *Synagelides medog* | Medog | Wang et al. 2024 |
| Sparassidae | *Pseudopoda conica* | Medog | Zhang et al. 2023 |
| | *Pseudopoda medogensis* | Medog | Jiang et al. 2018 |
| | *Pseudopoda shuo* | Medog | |
| | *Pseudopoda zhangi* | Medog | Fu and Zhu 2008 |
| Theraphosidae | *Chilobrachys jinchengi* | Medog | Lin et al. 2022 |
| Thomisidae | *Pharta xizang* | Medog | Li et al. 2023 |
| Zodariidae | *Asceua dawai* | Medog | Wang et al. 2024b |
| | *Mallinella medog* | Medog | |

and endites brown, longer than wide. Sternum brown and scutellate. Leg measurements: I 7.65 (2.22, 2.85, 1.55, 1.03); II 7.58 (2.21, 2.83, 1.48, 1.06); III 4.39 (1.45, 1.60, 0.69, 0.65); IV 4.37 (1.44, 1.62, 0.74, 0.57). Leg formula: 1234. Opisthosoma oval, black, with a white spot at mid-anterior part. Spinnerets black.

***Palp*** (Fig. 4A, B). Tibial as 1/2 of length cymbium, ventral tibial apophysis somewhat pediform, retrolateral tibial apophysis bifurcated: ventral arm thumb shaped, retrolateral arm hook-like in retrolateral view. Embolus originating at approximately 9-o'clock position, broad, curved along with bulb.

**Female** paratype (SWUC-T-THO-01-02, Fig. 3B) total length 6.60. Prosoma 3.04 long, 2.63 wide; opisthosoma 3.70 long, 3.22 wide. Eye sizes and interdistances: AME 0.11, ALE 0.21, PME 0.10, PLE, 0.19; AME–AME 0.49, AME–ALE 0.46, PME–PME 0.84, PME–PLE 0.60, ALE–PLE 0.32. MOA 0.45 long, anterior width

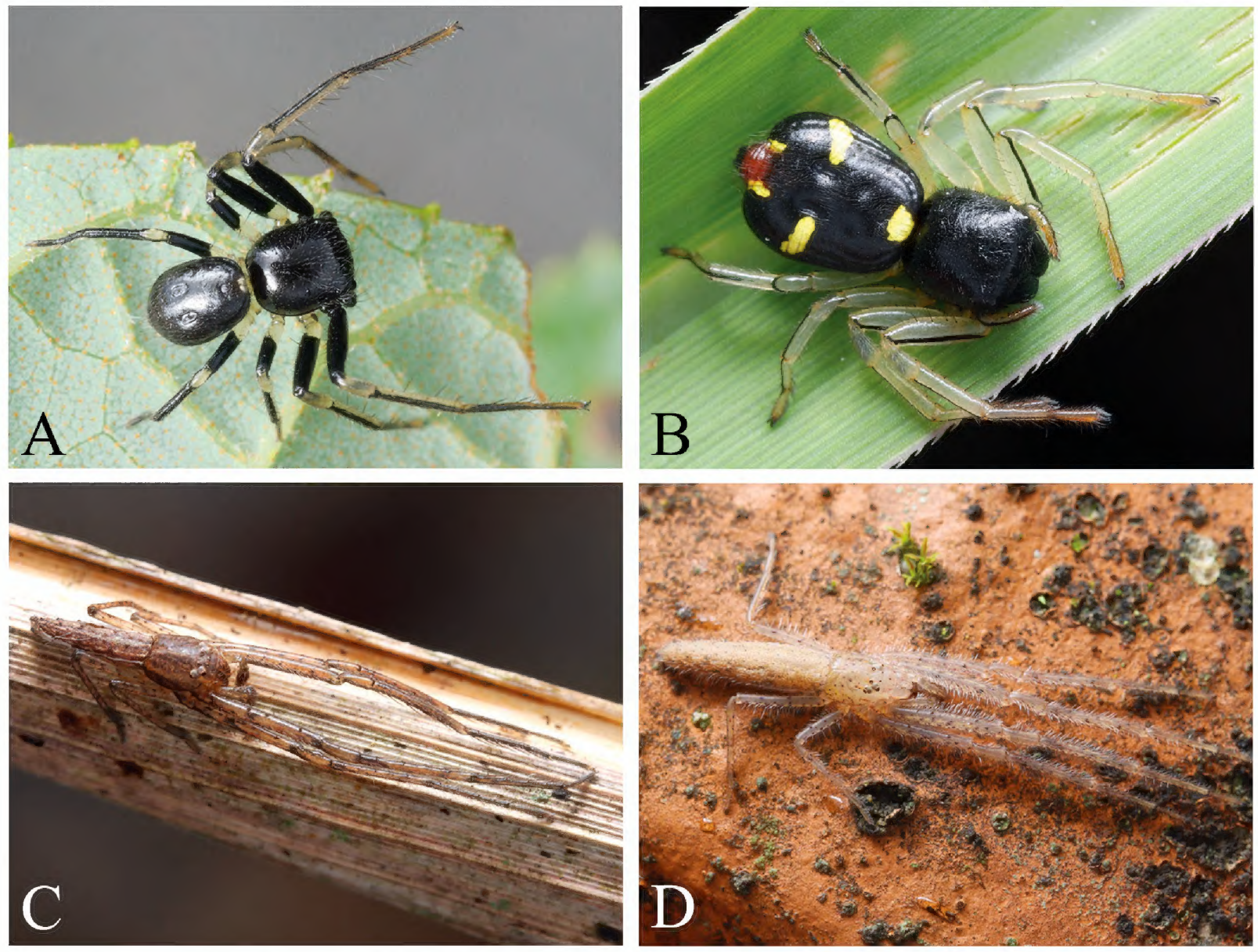


**Figure 1.** Living photos of crab spiders **A, B** *Camaricus medog* Wang, Lu & Zhang, sp. nov. **A** male holotype **B** female paratype **C, D** *Monaeses xizang* Wang, Lu & Zhang, sp. nov. **C** male holotype, **D** female paratype. Photographed by Qian-Le Lu.

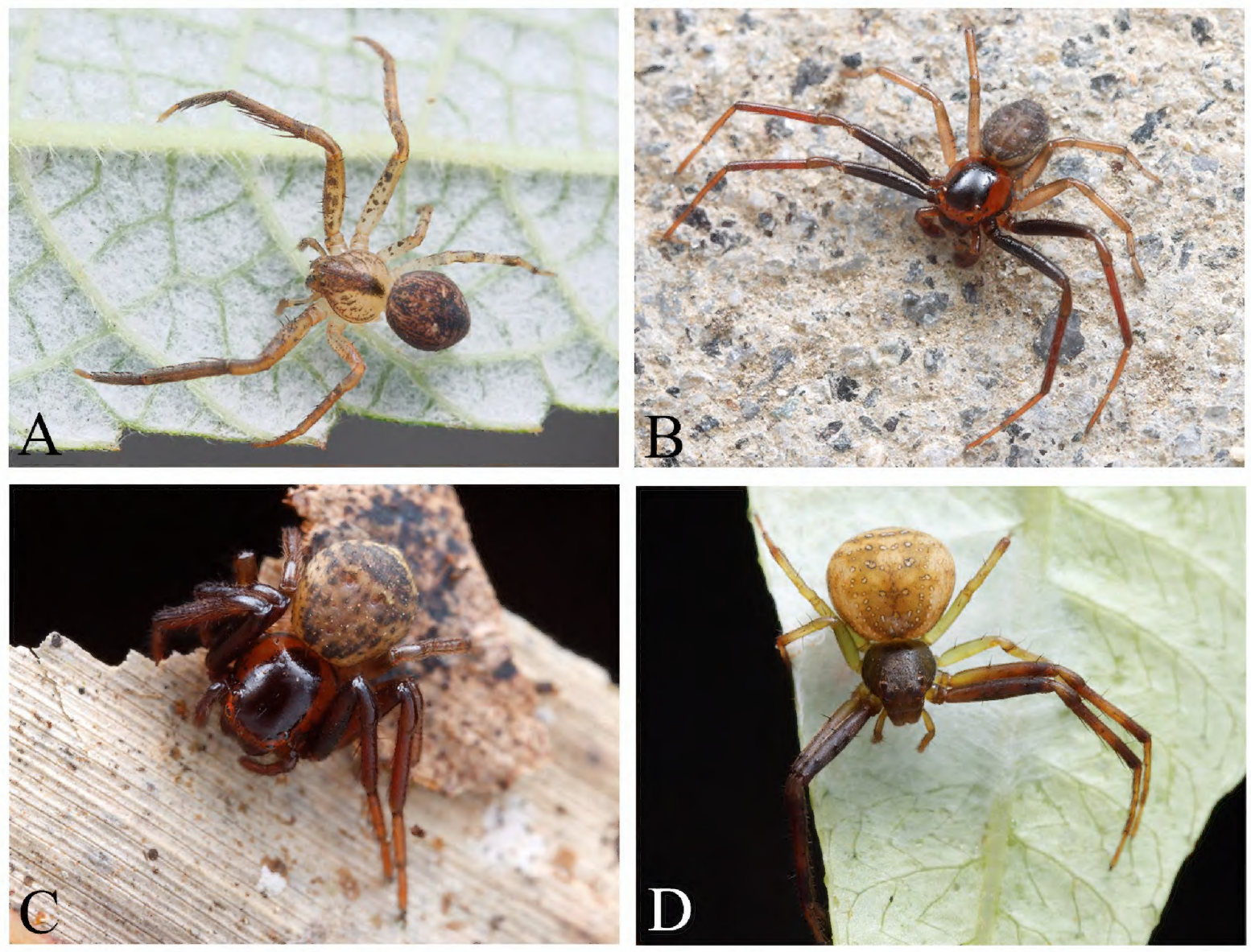


**Figure 2.** Living photos of crab spiders **A** *Pharta xizang* Liu & Yao, 2023, female **B, C** *Sinothomisus dawai* Wang, Lu & Zhang, sp. nov. **B** male holotype **C** female **D** *Spilosynema xizang* Wang, Lu & Zhang, sp. nov., female paratype. Photographed by Qian-Le Lu.

0.80, posterior width 1.04. Clypeus height 0.27. Leg measurements: I 7.07 (2.10, 2.55, 1.40, 1.02); II 7.16 (2.13, 2.70, 1.37, 0.96); III 4.72 (1.59, 1.77, 0.75, 0.61); IV 5.38 (1.74, 2.13, 0.87, 0.64). Leg formula: 2143. Opisthosoma oval, black, with 5 white (yellow when live) and one brown spots. Spinnerets black.

***Epigyne*** (Fig. 4C, D). Epigynal plate longer than wide. Copulatory opening located anteriorly. Copulatory ducts transparent and C-like. Spermathecae stomach shaped. Fertilization ducts crescent-shaped.

**Variation.** Males (*n = 2*) total length 4.50–4.92; females (*n = 4*) total length 6.60–8.00.

**Distribution.** Known only from the type locality, Medog, Xizang, China (Fig. 11).

## Genus *Monaeses* Thorell, 1869 (莫蟹蛛属)

### *Monaeses xizang* Wang, Lu & Zhang, sp. nov.

https://zoobank.org/6E866803-36E5-4324-8E7A-F8F686965881

Figs 1C, D, 3M, N, 5, 11

Common name. 西藏莫蟹蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-02-01), China, Xizang, Medog County, Mirage Observation Deck, 29°20'36"N, 95°20'43"E, elev. 1297 m, 8 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg. ***Paratype:*** • 1 ♀ (SWUC-T-THO-02-02), same data as for holotype.

**Etymology.** The specific name is derived from the type locality; it is a noun in apposition.

**Diagnosis.** The new species resembles *M. aciculus* (Simon, 1903) (Song and Zhu 1997: 59, fig. 35A–H) in having the ventral tibial apophysis of the same shape and spermathecae compressed, but the new species differs from *M. aciculus* in having the ventral tibial apophysis shorter than retrolateral tibial apophysis (vs as long as retrolateral tibial apophysis in *M. aciculus*), a short embolus originating at approximately 11-o'clock (vs long and originating at approximately 8-o'clock in *M. aciculus*), and comma-like copulatory ducts (vs U-shaped in *M. aciculus*) (Fig. 5).

**Description. Male** holotype (SWUC-T-THO-02-01, Figs 1C, 3M) total length 7.31. Prosoma 2.24 long, 1.82 wide; opisthosoma 5.33 long, 1.24 wide. Carapace yellow brown. Eye sizes and interdistances: AME 0.06, ALE 0.14, PME 0.09, PLE 0.18; AME–AME 0.17, AME–ALE 0.19, PME–PME 0.34, PME–PLE 0.29, ALE–PLE 0.31. MOA 0.40 long, anterior width 0.30, posterior width 0.51. Clypeus height 0.45. Chelicerae yellow brown. Labium and endites yellow brown, longer than wide. Sternum yellow-brown and scutellate, with brown hairs. Leg measurements: I 18.79 (5.43, 6.98, 4.57, 1.81); II 16.96 (5.06, 6.25, 3.94, 1.71); III 6.61 (2.10, 2.57, 1.09, 0.85); IV 7.81 (3.28, 2.52, 1.08, 0.93). Leg formula: 1243. Opisthosoma columnar, yellow brown. Spinnerets yellow-brown.

***Palp*** (Fig. 5A, B). Tibia ½ length of cymbium. Ventral tibial apophysis columnar, with a curved end. Retrolateral tibial apophysis sclerous, somewhat triangular, with a sharp end. Embolus originating at approximately 11-o'clock position, slender, curved along with bulb, tip staying in cymbial furrow.

**Female** paratype (SWUC-T-THO-02-02, Figs 1D, 3N) total length 10.70. Prosoma 3.23 long, 2.35 wide; opisthosoma 7.28 long, 1.88 wide. Eye sizes and interdistances: AME 0.07, ALE 0.22, PME 0.11, PLE, 0.19; AME–AME 0.32, AME–ALE 0.27, PME–PME 0.52, PME–PLE 041, ALE–PLE 0.39. MOA 0.49 long,

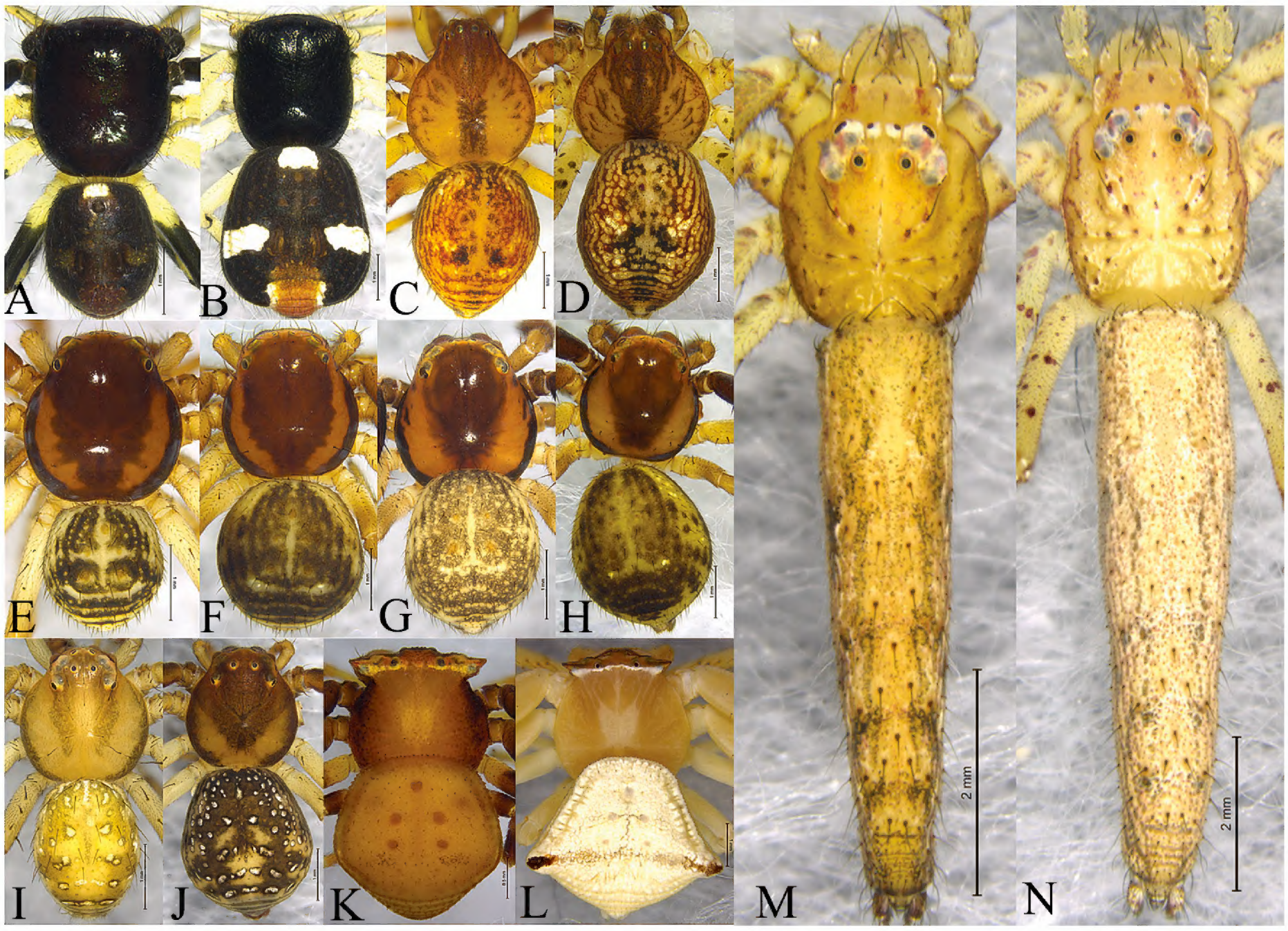


**Figure 3.** Habitus, dorsal view **A, B** *Camaricus medog* Wang, Lu & Zhang, sp. nov. (**A** male holotype **B** female paratype) **C, D** *Pharta xizang* Liu & Yao, 2023 (**C** male **D** female) **E, F** *Sinothomisus beibeng* Wang, Lu & Zhang, sp. nov. (**E** male holotype **F** female paratype) **G, H** *Sinothomisus dawai* Wang, Lu & Zhang, sp. nov. (**G** male holotype **H** female paratype) **I, J** *Spilosynema xizang* Wang, Lu & Zhang, sp. nov. (**I** male holotype **J** female paratype) **K, L** *Thomisus yarang* Wang, Lu & Zhang, sp. nov. (**K** male holotype, **L** female paratype) **M, N** *Monaeses xizang* Wang, Lu & Zhang, sp. nov. (**M** male holotype **N** female paratype).

anterior width 0.46, posterior width 0.74. Clypeus height 0.58. Leg measurements: I 16.12 (5.05, 6.17, 3.34, 1.56); II 14.41 (4.53, 5.52, 2.88, 1.48); III 14.30 (4.39, 5.53, 2.98, 1.40); IV 8.37 (3.57, 2.81, 1.11, 0.88). Leg formula: 1234.

***Epigyne*** (Fig. 5C, D). Epigynal plate almost rounded. Copulatory openings slit-like, distant from each other. Copulatory ducts comma-like. Spermathecae folded. Fertilization ducts crescent-shaped.

**Distribution.** Known only from the type locality, Medog, Xizang, China (Fig. 11).

## Genus *Pharta* Thorell, 1891 (范蟹蛛属)

### *Pharta xizang* Liu & Yao, 2023

Figs 2A, 3C, D, 6, 11

Common name. 西藏范蟹蛛

*Pharta xizang* Liu & Yao in Li et al., 2023: 176, fig. 4A–G (♀).

**Material examined. China, Xizang, Medog County:** • 2 ♂, Medog Town, 29°19.470'N, 95°19.618'E, elev. 1116 m, 27 June 2018, L.Y. Wang, Z.S. Wu and Y.N. Mu leg; • 1 ♀, Beibeng Township, Damu, 29°14'51"N, 95°11'1"E, elev. 924 m,

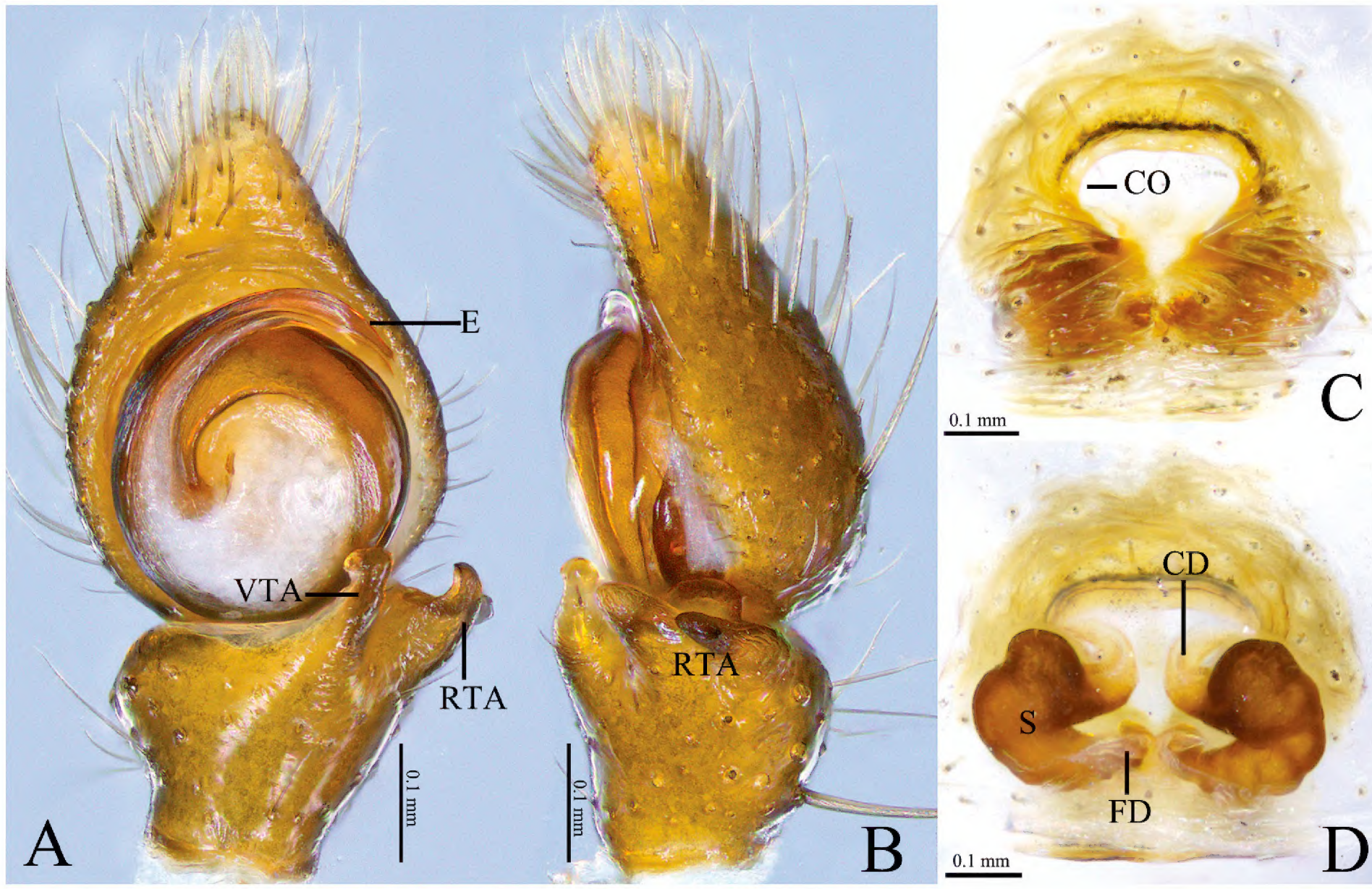


**Figure 4.** *Camaricus medog* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view. **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; E = embolus; FD = fertilization duct; RTA = retrolateral tibial apophysis; VTA = ventral tibial apophysis; S = spermathecal.

28 June 2018, L.Y. Wang, Y.N. Mu and Z.S. Wu leg; • 1 ♀, Medog Town, Yarang Village, 29°17.758'N, 95°16.827'E, elev. 761 m, 22 May 2019, L.Y. Wang, T. Yuan, P. Liu and H. Wang leg; • 1 ♀, Medog Town, 23 May 2019, L.Y. Wang, T. Yuan, P. Liu and H. Wang leg; • 2 ♂ 4 ♀, Beibeng Township, Badeng Village, 29°16'28"N, 95°10'7"E, elev. 851 m, 7 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg; • 2 ♂, Mirage Observation Deck, 29°20'36"N, 95°20'43"E, elev. 1297 m, 8 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg.

**Diagnosis.** This species resembles *P. tangi* Wang, Mi & Peng, 2016 (Wang et al. 2016: 130, figs 1A–G, 2A–D) in having similar shaped spermathecae, but differs it from the latter by the knife-like ventral tibial apophysis (vs rhabditiform and slightly curved in *P. tangi*), the multiple spines at the base of ventral tibial apophysis (vs spine absent in *P. tangi*), the folded posterior half part of conductor (vs knife-shaped in *P. tangi*), and the kidney-shaped spermathecae (vs long oval in *P. tangi*) (Fig. 6). This new species also resembles *P. gongshan* (Yang, Zhu & Song, 2006) (Benjamin 2011: 80, figs 47A, B, D–F, 49A–F, 51A–D) in having a similar shaped bulb, but it can be distinguished by the bifurcated tip of the conductor (vs not bifurcated in *P. gongshan*) and the small copulatory openings located towards the posterior (vs large copulatory openings towards the lateral).

**Description. Male** (Fig. 3C) total length 5.89. Prosoma 2.74 long, 2.40 wide; Opisthosoma 3.08 long, 2.43 wide. Carapace yellow-brown, with a deep-brown spot. Eye sizes and interdistances: AME 0.07, ALE 0.20, PME 0.16, PLE 0.18; AME–AME 0.12, AME–ALE 0.07, PME–PME 0.14, PME–PLE 0.16, ALE–PLE

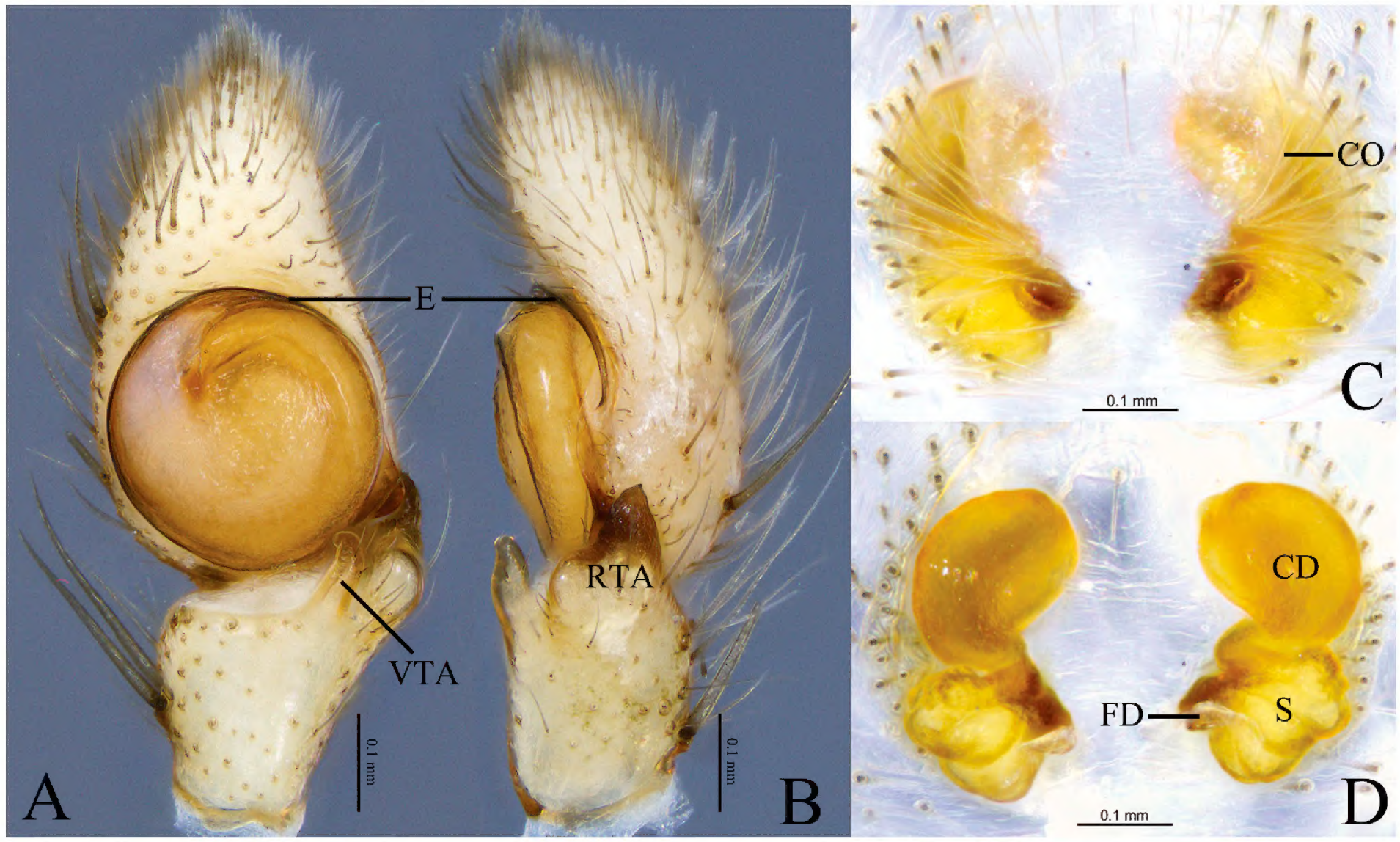


**Figure 5.** *Monaeses xizang* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; E = embolus; FD = fertilization duct; RTA = retrolateral tibial apophysis; VTA = ventral tibial apophysis; S = spermathecal.

0.17. MOA 0.42 long, anterior width 0.26, posterior width 0.45. Clypeus height 0.15. Chelicerae brown, with 3 promarginal and 3 retromarginal teeth. Labium and endites yellow-brown, longer than wide. Sternum yellow-brown and scutellate, with brown hairs. Leg measurements: I 11.47 (3.39, 4.34, 2.51, 1.23); II 10.92 (3.24, 4.14, 2.28, 1.26); III 6.16 (1.97, 2.34, 1.13, 0.72); IV 7.25 (2.28, 2.61, 1.58, 0.78). Leg formula: 1243. Opisthosoma oval, yellow, with a deep-red spot. Spinnerets yellow-brown.

***Palp*** (Fig. 6A–C). Tibia longer than wide. Ventral tibial apophysis knife-like, three times longer than wide, base of ventral tibial apophysis bulging, with multiple spines. Conductor originating from centre of bulb, base wider than embolus, anterior part folded as a furrow. Embolus strong, originating at approximately 9-o'clock position, with its tip staying in conductor furrow.

**Female** (Fig. 3D) total length 7.20. Prosoma 3.04 long, 2.52 wide; opisthosoma 3.82 long, 3.47 wide. Eye sizes and interdistances: AME 0.06, ALE 0.19, PME 0.16, PLE, 0.19; AME–AME 0.14, AME–ALE 0.10, PME–PME 0.14, PME–PLE 0.19, ALE–PLE 0.19. MOA 0.45 long, anterior width 0.27, posterior width 0.48. Clypeus height 0.17. Leg measurements: I 11.07 (3.28, 4.61, 2.16, 1.02); II 10.28 (3.09, 4.21, 1.92, 1.06); III 5.90 (1.88, 2.37, 0.99, 0.66); IV 7.24 (2.30, 2.65, 1.55, 0.74). Leg formula: 1243.

***Epigyne*** (Fig. 6D, E). Epigynal plate almost rounded. Copulatory openings small, rounded, far away from each other. Copulatory ducts short. Spermathecae kidney-shaped. Fertilization ducts crescent-shaped.

**Distribution.** China (Xizang, Medog) (Fig. 11).

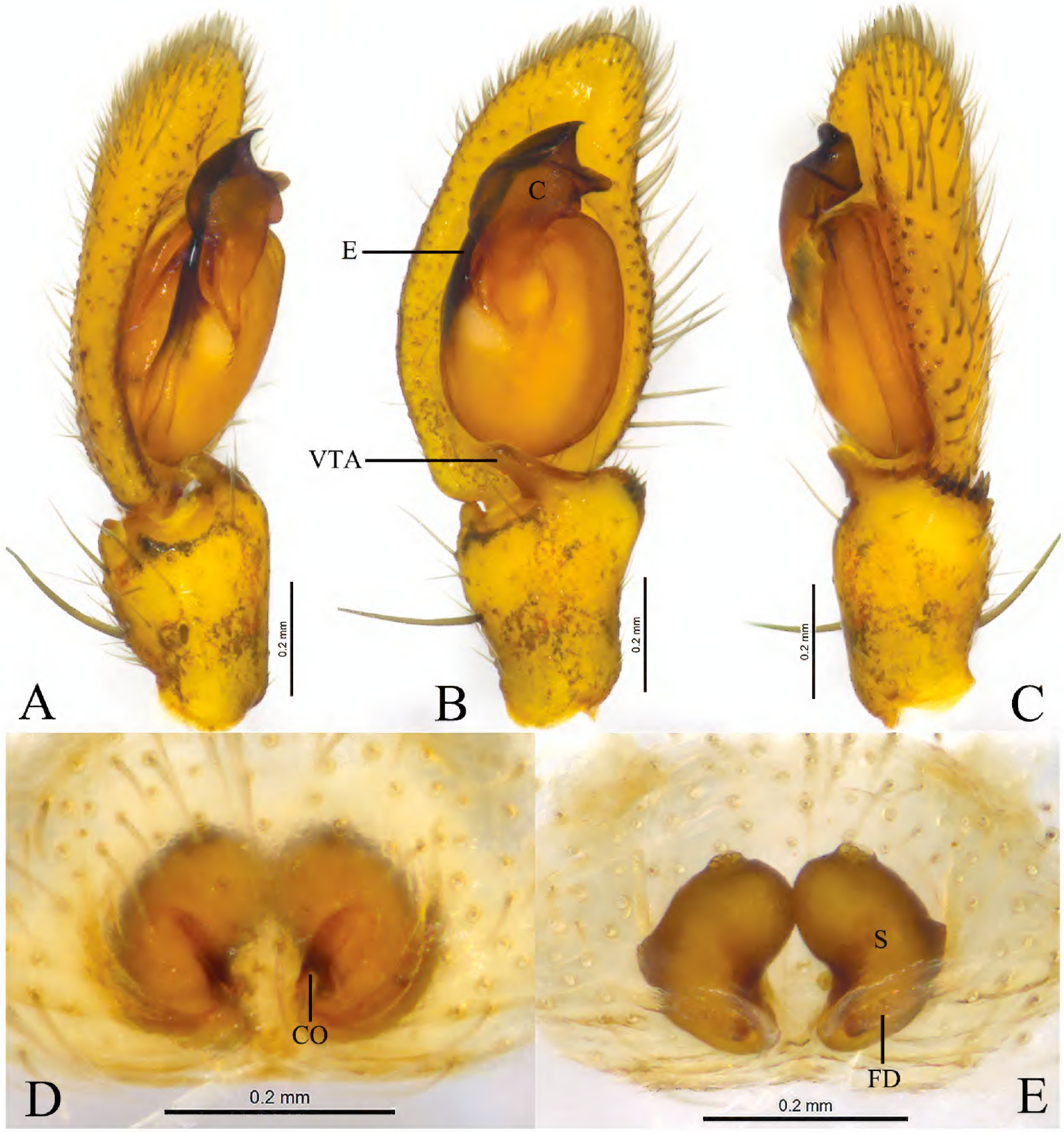


**Figure 6.** *Pharta xizang* Liu & Yao, 2023 **A** male left palp, prolateral view **B** same, ventral view **C** same, retrolateral view **D** epigyne, ventral view **E** same, dorsal view. Abbreviations: CD = copulatory duct; C = conductor; CO = copulatory opening; E = embolus; FD = fertilization duct; VTA = ventral tibial apophysis; S = spermathecal.

**Genus *Sinothomisus* Tang, Yin, Griswold & Peng, 2006** (华蟹蛛属)

***Sinothomisus beibeng* Wang, Lu & Zhang, sp. nov.**

https://zoobank.org/99A666E2-A89A-44A9-B224-ECA5C062D6CD

Figs 3E, F, 7, 11

Common name. 背崩华蟹蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-03-01), China, Xizang, Medog County, Beibeng Township, Damu, 29°14'51"N, 95°11'1"E, elev. 924 m, 28 June 2018, L.Y. Wang, Y.N. Mu and Z.S. Wu leg. ***Paratype*:** • 1 ♀ (SWUC-T-THO-03-02), same data as for holotype.

**Etymology.** The specific name is derived from the type locality; it is a noun in apposition.

**Diagnosis.** The new species resembles *S. liae* Tang, Yin, Griswold & Peng, 2006 (Tang et al. 2006: 65, figs 1–13) in having a similar shaped retrolateral

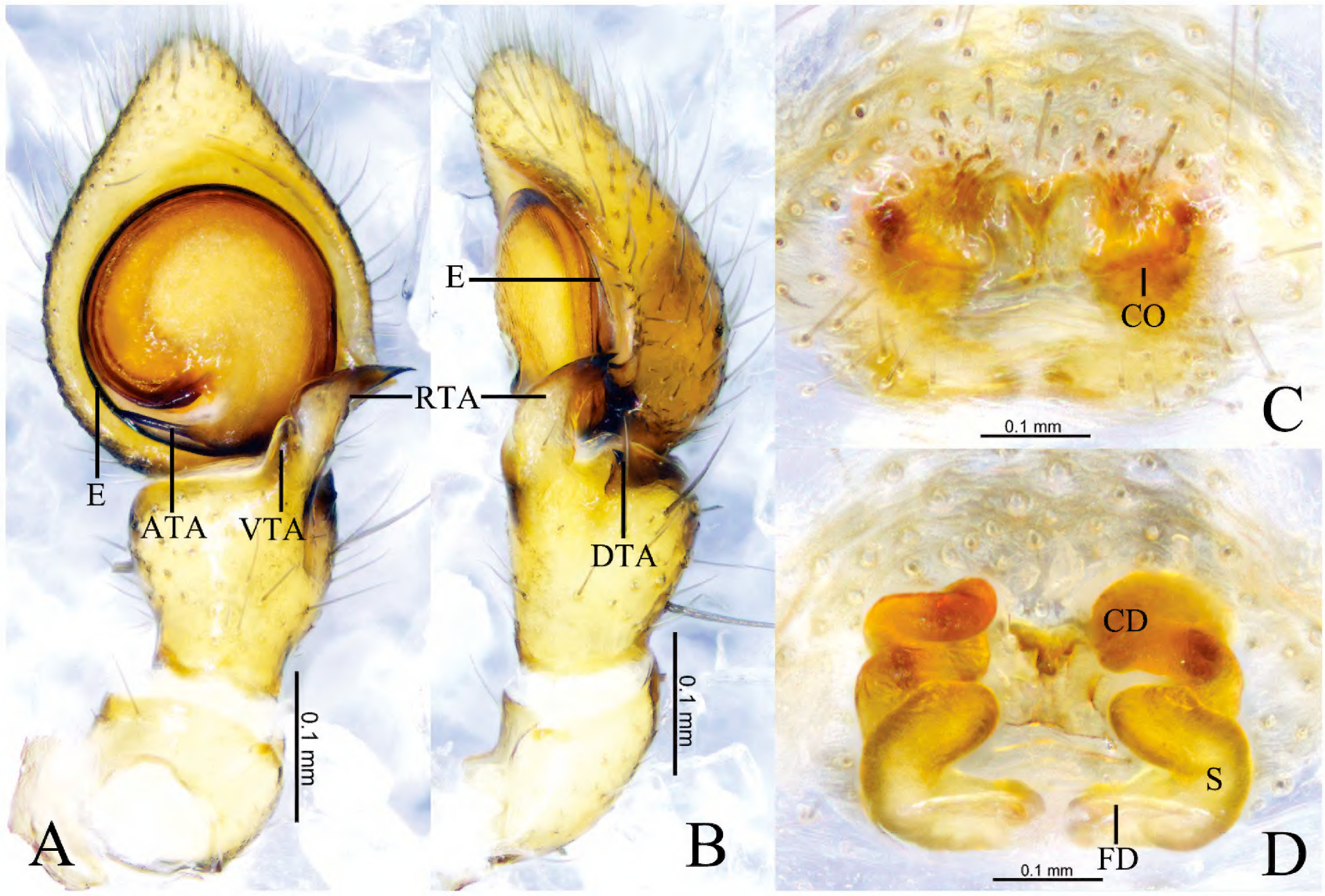


**Figure 7.** *Sinothomisus beibeng* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; DTA = dorsal tibial apophysis; E = embolus; FD = fertilization duct; RTA = retrolateral tibial apophysis; VTA = ventral tibial apophysis; S = spermathecal.

tibial apophysis, but it differs from the latter by the retrolateral tibial apophysis which is shorter than the bulb (vs equal in length to the bulb in *S. liae*), the long, thin apical tegular apophysis (vs short and wide in *S. liae*), and the C-like spermathecae (vs caterpillar-like in *S. liae*) (Fig. 7). This new species also resembles *S. dawai* Wang, Lu & Zhang, sp. nov.; see diagnosis for *S. dawai*.

**Description. Male** holotype (SWUC-T-THO-03-01, Fig. 3E) total length 4.03. Prosoma 2.19 long, 2.12 wide; opisthosoma 1.96 long, 1.56 wide. Carapace border black, with a large, deep-brown spot in the middle. Eye sizes and interdistances: AME 0.08, ALE 0.17, PME 0.02, PLE 0.16; AME–AME 0.22, AME–ALE 0.23, PME–PME 0.26, PME–PLE 0.47, ALE–PLE 0.19. MOA 0.22 long, anterior width 0.37, posterior width 0.30. Clypeus height 0.22. Chelicerae brown. Labium and endites brown, longer than wide. Sternum brown and scutellate, with brown hairs. Leg measurements: I 8.09 (2.39, 2.89, 1.65, 1.16); II 8.36 (2.46, 3.07, 1.64, 1.19); III 5.27 (1.70, 1.96, 0.84, 0.77); IV 5.25 (1.71, 1.90, 0.94, 0.70). Leg formula: 2134. Opisthosoma oval, yellow, with a black spot. Spinnerets brown.

***Palp*** (Fig. 7A, B). Tibia longer than wide. Ventral tibial apophysis small, thumb-shaped, near retrolateral tibial apophysis. Retrolateral tibial apophysis four times longer than ventral tibial apophysis, jellyfish-shaped in retrolateral view. Dorsal tibial apophysis small, conical. Bulb flat, apical tegular apophysis thin and long. Embolus filiform, originating at approximately 6-o'clock position, curved along with bulb, tip staying in cymbial furrow.

**Female** paratype (SWUC-T-THO-03-02, Fig. 3F) total length 4.86. Prosoma 2.37 long, 2.17 wide; opisthosoma 2.48 long, 2.32 wide. Eye sizes and interdistances: AME 0.08, ALE 0.19, PME 0.02, PLE 0.16; AME–AME 0.23, AME–ALE 0.26, PME–PME 0.26, PME–PLE 0.52, ALE–PLE 0.23. MOA 0.26 long, anterior width 0.40, posterior width 0.32. Clypeus height 0.25. Leg measurements: I 6.90 (2.13, 2.60, 1.26, 0.91); II 7.16 (2.24, 2.62, 1.30, 1.00); III 4.85 (1.56, 1.87, 0.70, 0.72); IV 4.81 (1.60, 1.73, 0.81, 0.67). Leg formula: 2134.

***Epigyne*** (Fig. 7C, D). Epigynal plate as long as wide. Copulatory openings slit-like, distant from each other. Copulatory ducts S-like. Spermathecae C-shaped. Fertilization ducts crescent-shaped.

**Distribution.** Known only from the type locality, Medog, Xizang, China (Fig. 11).

### *Sinothomisus dawai* Wang, Lu & Zhang, sp. nov.

https://zoobank.org/36CEFA28-BE47-4CBD-8D15-BD72D8EAC7D9

Figs 2B, C, 3G, H, 8, 11

Common name. 达娃华蟹蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-04-01), China, Xizang, Medog County, Mirage Observation Deck, 29°20'36"N, 95°20'43"E, elev. 1297 m, 8 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg. ***Paratypes:*** • 1 ♂ (SWUC-T-THO-04-02), same data as for holotype; • 1 ♀ (SWUC-T-THO-04-03), Beibeng Township, Damu, 29°14'51"N, 95°11'1"E, elev. 924 m, 28 June 2018, L.Y. Wang, Y.N. Mu and Z.S. Wu leg.

**Etymology.** The specific name is a patronym in honor of Mr. Dawa from the Tibet Plateau Institute of Biology in Lhasa, Xizang.

**Diagnosis.** The new species resembles *S. beibeng* Wang, Lu & Zhang, sp. nov. (Fig. 7) in having same shaped bulb and same position of embolus origin, but differs from the latter by the long and large retrolateral tibial apophysis (vs short and C-like in *S. beibeng*), the small spine between the retrolateral tibial apophysis and the dorsal tibial apophysis (vs absent in *S. beibeng*), the finger-nail-like protuberance at epigynal plate (vs absent in *S. beibeng*) (Fig. 8).

**Description. Male** holotype (SWUC-T-THO-04-01, Figs 2B, 3G) total length 4.21. Prosoma 2.19 long, 2.04 wide; Opisthosoma 2.34 long, 1.92 wide. Carapace border black, with a large deep brown spot in the middle. Eye sizes and interdistances: AME 0.07, ALE 0.18, PME 0.01, PLE 0.16; AME–AME 0.24, AME–ALE 0.21, PME–PME 0.24, PME–PLE 0.45, ALE–PLE 0.21. MOA 0.24 long, anterior width 0.37, posterior width 0.29. Clypeus height 0.18. Chelicerae brown. Labium and endites brown, longer than wide. Sternum brown and scutellate, with brown hairs. Leg measurements: I 8.40 (2.54, 3.04, 1.58, 1.24); II 8.52 (2.62, 3.07, 1.63, 1.20); III 5.42 (1.81, 1.98, 0.91, 0.72); IV 5.34 (1.70, 1.99, 0.95, 0.70). Leg formula: 2134. Opisthosoma oval, yellow, with black spot. Spinnerets brown.

***Palp*** (Fig. 8A, B). Tibia as long as wide. Ventral tibial apophysis small, thumb shaped, closing to retrolateral tibial apophysis. Retrolateral tibial apophysis middle part bulging, with a hook end. Dorsal tibial apophysis small, cone-shaped. A spine-like tubercle between retrolateral tibial apophysis and dorsal tibial apophysis. Bulb flat, apical tegular apophysis nail-shaped. Embolus filiform, originating at approximately 6-o'clock position, curved along with bulb, tip staying in cymbial furrow.

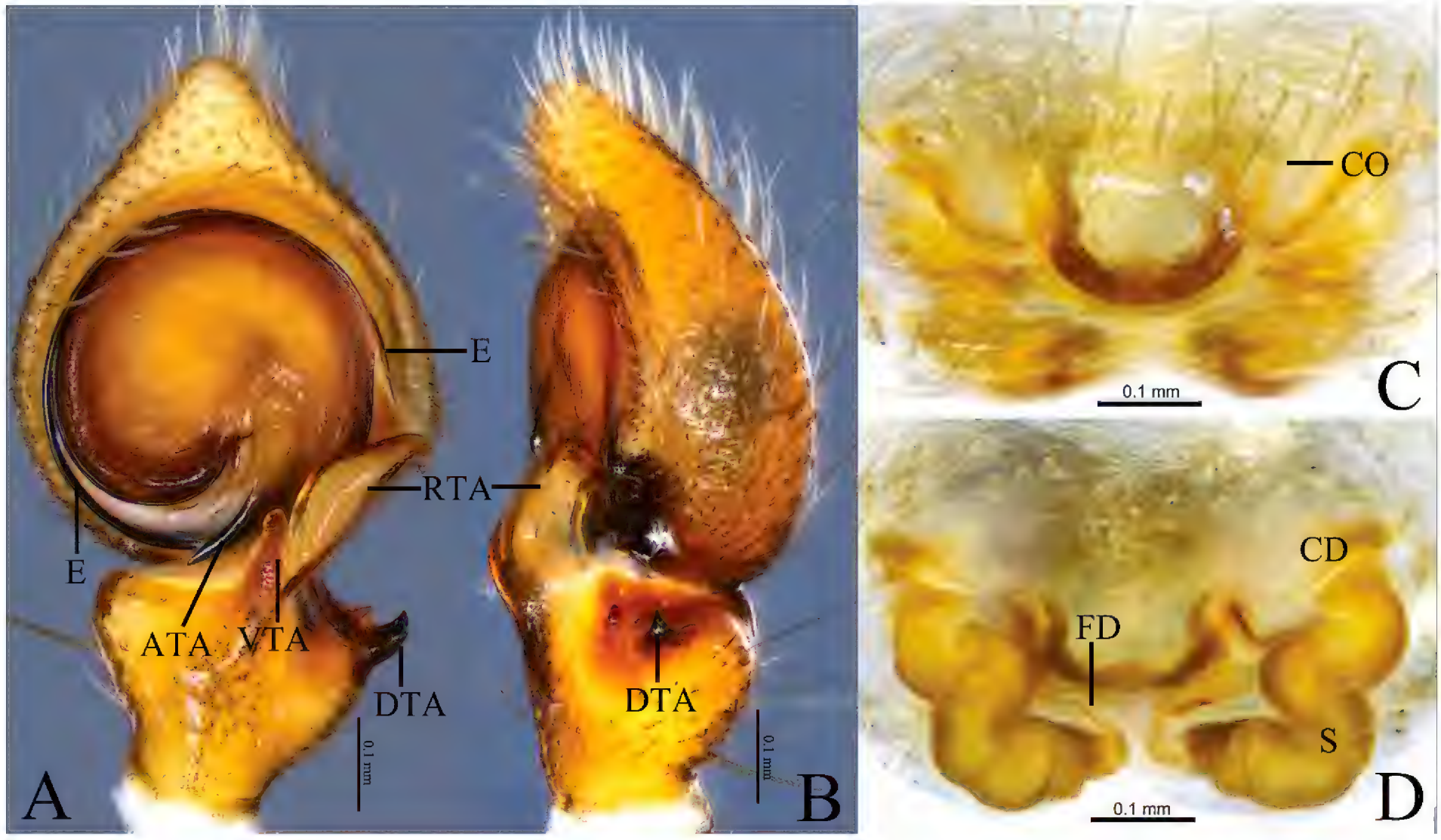


**Figure 8.** *Sinothomisus dawai* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; DTA = dorsal tibial apophysis; E = embolus; FD = fertilization duct; RTA = retrolateral tibial apophysis; VTA = ventral tibial apophysis; S = spermathecal.

**Female** paratype (SWUC-T-THO-04-03, Fig. 3H) total length 5.59. Prosoma 2.28 long, 2.25 wide; opisthosoma 3.10 long, 2.61 wide. Eye sizes and interdistances: AME 0.08, ALE 0.18, PME 0.02, PLE 0.15; AME–AME 0.28, AME–ALE 0.25, PME–PME 0.25, PME–PLE 0.54, ALE–PLE 0.25. MOA 0.26 long, anterior width 0.46, posterior width 0.33. Clypeus height 0.22. Leg measurements: I 7.00 (2.19, 2.56, 1.30, 0.95); II 7.35 (2.30, 2.79, 1.28, 0.98); III 5.05 (1.65, 1.90, 0.76, 0.74); IV 4.84 (1.44, 1.86, 0.84, 0.70). Leg formula: 2134.

***Epigyne*** (Fig. 8C, D). Epigynal plate wider than long, with a fingernail-like protuberance at middle part. Copulatory openings slit like, far away from each other. Copulatory ducts S-like. Spermathecae C-shaped. Fertilization ducts crescent.

**Variation.** Males (*n* = *2*) total length 4.21–5.17.

**Distribution.** China (Xizang, Medog) (Fig. 11).

## Genus *Spilosynema* Tang & Li, 2010 (花斑蛛属)

### *Spilosynema motuo* Wang, Lu & Zhang, sp. nov.

https://zoobank.org/C8CEDAA7-E58F-43AF-B415-3B0C06A84AE4

Figs 2D, 3I–J, 9, 11

Common name. 墨脱花斑蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-05-01), China, Xizang, Medog County, Beibeng Township, 29°14.87'N, 95°11.02'E, elev. 924 m, 19 December 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and Y.N. Mu leg. ***Paratypes:*** • 1 ♀ (SWUC-T-THO-05-02), Beibeng Township, Damu, 29°14'51"N, 95°11'1"E, elev. 924 m, 28

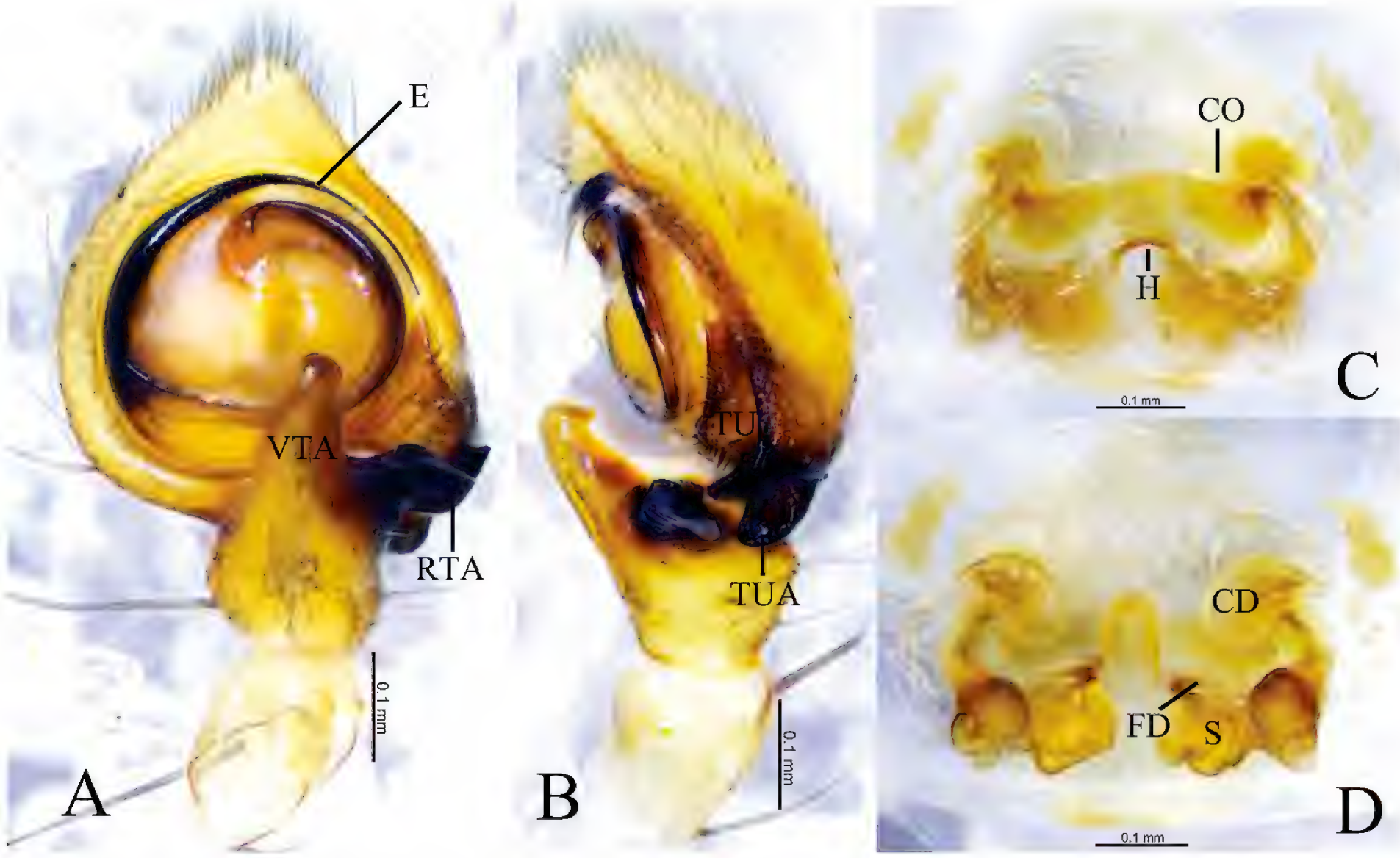


**Figure 9.** *Spilosynema motuo* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; E = embolus; FD = fertilization duct; H = hood; RTA = retrolateral tibial apophysis; Tu = tutaculum; TUA = tutacular apophysis; VTA = ventral tibial apophysis; S = spermathecal.

June 2018, L.Y. Wang, Y.N. Mu and Z.S. Wu leg. • 1 ♀ (SWUC-T-THO-05-03), Dexing Township, Guoguotang, 29°19.560'N, 95°16.360'E, elev.1025 m, 29 June 2018, L.Y. Wang, Y.N. Mu and Z.S. Wu leg. • 1 ♀ (SWUC-T-THO-05-04), Beibeng Township, Bayang Village, 29°12'49"N, 95°5'43"E, elev. 738 m, 7 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg. • 1 ♀ (SWUC-T-THO-05-05), Beibeng Township, Badeng Village, 29°16'28"N, 95°10'7"E, elev. 851 m, 7 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg. • 3 ♀ (SWUC-T-THO-05-06~08), Mirage Observation Deck, 29°20'36"N, 95°20'43"E, elev. 1297 m, 8 July 2023, Z.S. Zhang, L.Y. Wang, Q.L. Lu and X.L. Chen leg.

**Etymology.** The specific name is derived from the type locality (medog = motuo); it is a noun in apposition.

**Diagnosis.** The male of this new species resembles *S. comminum* Tang & Li, 2010 (Tang and Li 2010: 70, figs 52A–D, 54A, B) in the bulb of the same shape and the embolus origin in the same position, but it differs from the latter by the absence of an intermedial tibial apophysis (vs presence in *S. comminum*), the conical tutacular apophysis (vs hook-shaped in *S. comminum*) (Fig. 9A, B). The female of this new species can be distinguished from all other *Spilosynema* species in having the epigynal plate with a hood.

**Description. Male** holotype (Fig. 3I) total length 4.20. Prosoma 2.12 long, 1.98 wide; Opisthosoma 2.18 long, 1.65 wide. Carapace yellow brown. Eye sizes and interdistances: AME 0.11, ALE 0.21, PME 0.09, PLE 0.15; AME–AME 0.19, AME–ALE 0.18, PME–PME 0.23, PME–PLE 0.34, ALE–PLE 0.26. MOA 0.45 long, anterior width 0.40, posterior width 0.40. Clypeus height 0.19. Chelicerae

brown, with 2 promarginal and 2 retromarginal teeth. Labium and endites brown, longer than wide. Sternum brown and scutellate, with brown hairs. Leg measurements: I 10.49 (2.89, 3.53, 2.64, 1.43); II 10.38 (2.88, 3.59, 2.55, 1.36); III 5.47 (1.72, 1.99, 0.98, 0.78); IV 5.96 (1.99, 2.11, 1.11, 0.75). Leg formula: 1243. Opisthosoma oval, yellow-brown, with a scaly spot. Spinnerets brown.

***Palp*** (Fig. 9A, B). Tibia as long as wide. Ventral tibial apophysis strong, tip slightly hooked. Retrolateral tibial apophysis curved and strongly sclerotized. Cymbium base with two apophyses. Bulb flat. Embolus filiform, originating at approximately 8-o'clock position, curved along with bulb, tip staying in cymbial furrow.

**Female** paratype (SWUC-T-THO-05-02, Fig. 3J) total length 5.23. Prosoma 2.28 long, 2.18 wide; opisthosoma 2.93 long, 2.58 wide. Eye sizes and interdistances: AME 0.11, ALE 0.22, PME 0.10, PLE 0.14; AME–AME 0.25, AME–ALE 0.20, PME–PME 0.30, PME–PLE 0.44, ALE–PLE 0.35. MOA 0.45 long, anterior width 0.49, posterior width 0.53. Clypeus height 0.24. Leg measurements: I 10.10 (2.97, 3.64, 2.28, 1.21); II 9.98 (3.02, 3.49, 2.29, 1.18); III 5.10 (1.55, 1.90, 0.98, 0.67); IV 5.58 (1.82, 1.92, 1.10, 0.74). Leg formula: 1243.

***Epigyne*** (Fig. 9C, D). Epigynal plate wider than long, with a hood at middle. Copulatory openings slit-like, distant from each other. Copulatory ducts S-like. Spermathecae peanut-shaped. Fertilization ducts crescent-shaped.

**Variation.** Females (*n* = *7*) total length 5.23–5.93.

**Distribution.** China (Xizang, Medog) (Fig. 11).

## Genus *Thomisus* Walckenaer, 1805 (蟹蛛属)

### *Thomisus yarang* Wang, Lu & Zhang, sp. nov.

https://zoobank.org/D3B67A42-9792-4B5D-BB7B-077186A88D48

Figs 3K–L, 10, 11

Common name. 亚让蟹蛛

**Type material.** ***Holotype*** • ♂ (SWUC-T-THO-06-01), China, Xizang, Medog County, Medog Town, Yarang Village, 29°17.758'N, 95°16.827'E, elev. 761 m, 28 June 2018, L.Y. Wang, Z.S. Wu and Y.N. Mu leg. ***Paratypes*:** • 1 ♂ 1 ♀ (SWUC-T-THO-06-02 and SWUC-T-THO-06-02-03), same data as for holotype.

**Etymology.** The specific name is derived from the type locality; it is a noun in apposition.

**Diagnosis.** The new species resembles *T. labefactus* Karsch, 1881 (Song and Zhu 1997: 167, fig. 117A–E) in having a similar long and curved embolus, but it differs from the latter by the long, digitiform ventral tibial apophysis (vs short and conical in *T. labefactus*), the groove-shaped retrolateral tibial apophysis (vs base stretches in *T. labefactus*), and the arc-shaped copulatory ducts (vs semicircular in *T. labefactus*) (Fig. 10).

**Description. Male** holotype (SWUC-T-THO-06-01, Fig. 3K) total length 3.84. Prosoma 1.90 long, 1.98 wide; opisthosoma 2.24 long, 2.31 wide. Carapace brown, with a great many small denticles. Eye sizes and interdistances: AME 0.12, ALE 0.14, PME 0.11, PLE 0.10; AME–AME 0.27, AME–ALE 0.32, PME–PME 0.57, PME–PLE 0.42, ALE–PLE 0.24. MOA 0.39 long, anterior width 0.51, posterior width 0.75. Clypeus height 0.30. Chelicerae brown, with 3 promarginal and 2 retromarginal teeth. Leg measurements: I 5.35 (1.75, 1.87, 0.97, 0.76); II 5.48 (1.82, 1.93, 0.95, 0.78); III 2.94 (0.95, 1.06, 0.49, 0.44); IV 3.11 (1.04, 1.02,

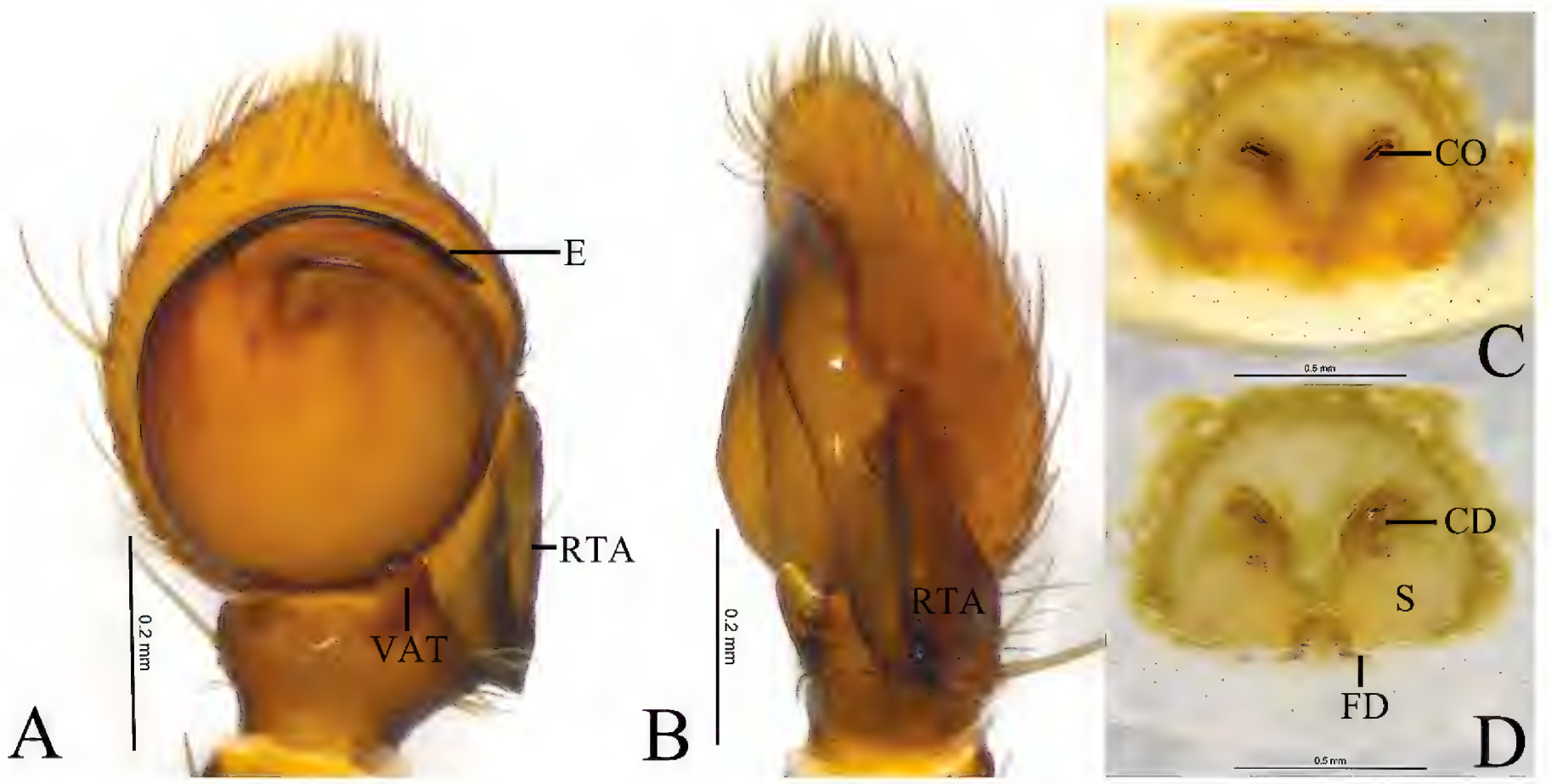


**Figure 10.** *Thomisus yarang* Wang, Lu & Zhang, sp. nov. **A, B** holotype male **C, D** paratype female **A** male left palp, ventral view **B** same, retrolateral view **C** epigyne, ventral view **D** same, dorsal view. Abbreviations: CD = copulatory duct; CO = copulatory opening; E = embolus; FD = fertilization duct; RTA = retrolateral tibial apophysis; VTA = ventral tibial apophysis; S = spermathecal.

0.58, 0.47). Leg formula: 2143. Opisthosoma brown, dorsum with small spines, venter yellow.

***Palp*** (Fig. 10A, B). Tibia as long as wide. Ventral tibial apophysis blunt, digitiform. Retrolateral tibial apophysis large, wide, groove-shaped. Embolus originating at approximately 11-o'clock position, curved along with bulb.

**Female** paratype (SWUC-T-THO-06-03, Fig. 3L) total length 10.73. Prosoma 5.42 long, 5.19 wide; opisthosoma 5.84 long, 8.29 wide. Carapace yellowish. Eye sizes and interdistances: AME 0.20, ALE 0.23, PME 0.16, PLE 0.18; AME–AME 0.56, AME–ALE 0.71, PME–PME 1.09, PME–PLE 0.73, ALE–PLE 0.37. MOA 0.79 long, anterior width 0.95, posterior width 1.43. Clypeus height 0.65. Leg measurements: I 15.60 (4.99, 5.75, 2.81, 2.05); II 14.69 (4.74, 5.51, 2.69, 1.75); III 8.68 (2.92, 3.14, 1.62, 1.00); IV 10.14 (3.30, 3.72, 1.93, 1.19). Leg formula: 2143. Opisthosoma white, with a brown spot.

***Epigyne*** (Fig. 10C, D). Epigynal plate oval. Copulatory openings arc-like, distant from each other. Copulatory ducts arc-like, three times longer than wide. Spermathecae transparent, spherical. Fertilization ducts crescent-shaped.

**Variation.** Males (*n = 2*) total length 3.29–3.84.

**Distribution.** Known only from the type locality, Medog, Xizang, China (Fig. 11).

## Discussion

Among these seven species of crab spiders described here, only *Pharta xizang* Liu & Yao, 2023 was active at night. The rest of the species were collected during the day. All six new species were collected from flower beds along the side of a road, except *Monaeses xizang* Wang, Lu & Zhang, sp. nov. which was also collected from a road guardrail. It may be due to the abundance of precipitation, which makes the forest too dense and humid, so the crab-spider spiders go out of the forest to live at the edges.

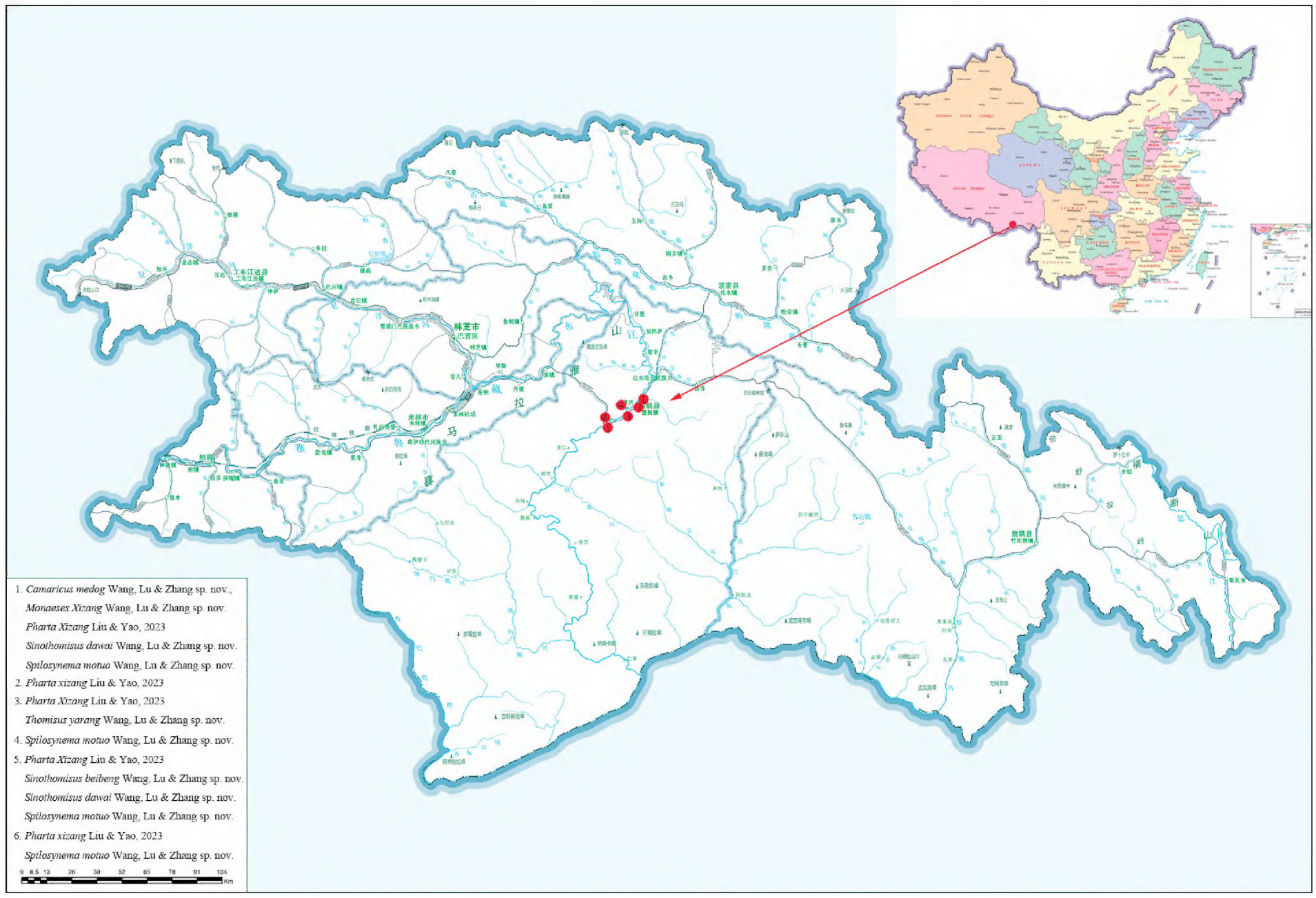
1. Camaricus medog Wang, Lu & Zhang sp. nov.,
Monaeses Xizang Wang, Lu & Zhang sp. nov.
Pharta Xizang Liu & Yao, 2023
Sinothomisus dawai Wang, Lu & Zhang sp. nov.
Spilosynema motuo Wang, Lu & Zhang sp. nov.
2. Pharta xizang Liu & Yao, 2023
3. Pharta Xizang Liu & Yao, 2023
Thomisus yarang Wang, Lu & Zhang sp. nov.
4. Spilosynema motuo Wang, Lu & Zhang sp. nov.
5. Pharta Xizang Liu & Yao, 2023
Sinothomisus beibeng Wang, Lu & Zhang sp. nov.
Sinothomisus dawai Wang, Lu & Zhang sp. nov.
Spilosynema motuo Wang, Lu & Zhang sp. nov.
6. Pharta xizang Liu & Yao, 2023
Spilosynema motuo Wang, Lu & Zhang sp. nov.
0 6.5 13 26 39 52 65 78 91 104
Km

**Figure 11.** Distribution of crab spiders from Medog, Xizang, China.

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## Additional information

### Conflict of interest

The authors have declared that no competing interests exist.

### Ethical statement

No ethical statement was reported.

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## Data availability

All of the data that support the findings of this study are available in the main text.

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